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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/712,729
Appellant : David Charles Pender et al.
Filed : November 12, 2003
Title : SYSTEM AND SUPPORT ROD ASSEMBLY FOR
SINTERING FIBER OPTIC SLEEVE TUBES
Art Unit : 1731
Confirmation No. : 9280
Examiner : Queenie S. Dehghan
Docket No. : 128518-1
Customer No. : 006147

APPEAL BRIEF

(In compliance with 37 CFR § 41.37)

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P.O. Box 1450
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In response to the Office Communication dated June 23, 2006, Appellant submits this Appeal Brief and the fee specified in 37 CFR § 41.20(b)(2) (\$500.00 for a large entity).

Real Party in Interest – 37 C.F.R. 41.37(c)(1)(i)

The General Electric Company is the real party in interest.

Related Appeals and Interferences – 37 C.F.R. 41.37(c)(1)(ii)

None aware of.

Status of Claims – 37 C.F.R. 41.37(c)(1)(iii)

On July 6, 2006, Appellant appealed from the final rejection of claims 1-20. No claims stand withdrawn. No claims are allowed or objected to. Claims 1-20 are currently pending and the subject of this Appeal.

Status of Amendments – 37 C.F.R. 41.37(c)(1)(iv)

All amendments appear to have been entered. The Office communication dated June 23, 2006 does not indicate whether the amendment to the specification was entered, or was not entered. Appellant had requested that if a favorable notice allowance was not forthcoming that the amendment be entered for the purpose of this Appeal. Accordingly, Appellant assumes that the request was granted seeing no indication to the contrary. Claims 1-20 are pending and the subject of Appeal, and there are no outstanding amendments.

Summary of Claimed Subject Matter – 37 C.F.R. 41.37(c)(1)(v)

The only pending independent claim is claim 1. With reference to Fig. 5, Claim 1 defines a system 300 (page 8, paragraph [0019], line 7) for sintering a quartz tube 340 (page 8, paragraph [0019], line 5). The quartz tube 340 (page 8, paragraph [0019], line 5) has a cylindrical wall (page 8, paragraph [0019], line 6) defining an annular space (page

8, paragraph [0019], line 6) and an outer layer of silica soot (page 8, paragraph [0019], line 6) deposited on an outer surface (page 8, paragraph [0019], line 6) of the quartz tube 340. The system includes a furnace 310 (page 8, paragraph [0019], line 7) for heating the quartz tube 340 (page 8, paragraph [0019], line 7) in a controlled atmosphere (page 8, paragraph [0019], line 8). A support rod assembly 320 (page 8, paragraph [0019], line 8) fits into the annular space (page 8, paragraph [0019], line 9). The support rod assembly 320 (page 9, paragraph [0019], line 1) includes a cylindrical support rod 322 (page 10, paragraph [0022], line 3) and a retaining portion 326 (page 10, paragraph [0022], line 4).

The cylindrical support rod 322 (page 10, paragraph [0022], line 3) has a central portion 324 (page 10, paragraph [0023], lines 1-3). The central portion 324 (page 10, paragraph [0023], lines 1-3) has a surface roughness of from about 0.1 micron to about 4 microns (page 10, paragraph [0023], line 3). The central portion 324 (page 10, paragraph [0023], lines 1-3) has an ovality of up to about 0.5 mm and a bow of up to about 0.7 mm/m along a longitudinal axis (page 10, paragraph [0023], line 7) of the support rod assembly 320 (page 10, paragraph [0023], line 8). The cylindrical support rod 322 (page 10, paragraph [0023], line 8) has a coefficient of thermal expansion that is greater than a coefficient of thermal expansion of the quartz tube 340 (page 11, paragraph [0024], lines 1-2). The support rod assembly 320 (page 10, paragraph [0023], line 8) is substantially chemically inert (page 11, paragraph [0024], lines 3-5) with respect to silica (page 11, paragraph [0024], line 3) in an atmosphere comprising an inert gas and at least one of fluorine, chlorine, and combinations thereof at temperatures of at least 1400 °C (page 11, paragraph [0024], lines 1-9). The support rod assembly 320 straightens and supports the quartz tube 340 (page 10, paragraph [0022], lines 1-2). The support rod assembly 320 further prevents tapering of the quartz tube 340 inner diameter due to creep during sintering of the quartz tube 340 (page 13, paragraph [0034], line 8). The retaining portion 326 couples to at least one end of the cylindrical support rod 322 to prevent slippage (page 13, paragraph [0033], line 5) of the quartz tube 340 from the support rod assembly 320.

The system 300 further includes means for positioning said support rod assembly 320 and said quartz tube 340 within the heating zone (page 12, paragraph [0031], lines 1 et seq.). The positioning means is indicated with reference number 330 as seen in Fig. 5.

The remaining claims are dependent on claim 1 and discuss various additional structural and functional limitations.

Grounds of Rejection to be Reviewed on Appeal – 37 C.F.R. 41.37(c)(1)(vi)

Whether claims 1-20 were properly rejected under 35 USC § 103 as being unpatentable. Particularly, whether Claims 1-8, 10, 20 were rejected under 35 USC § 103 as being unpatentable over Miller in view of a plurality of other references, claims 9-12, and 19 were rejected under 35 USC § 103 as unpatentable over Miller in view of Monberg and the other art references, claims 14-15 were rejected under 35 USC § 103 as unpatentable over Miller in view of Monberg and the other art references, and claims 16-18 were rejected under 35 USC § 103 as unpatentable over Miller in view of Monberg and the other art references. Wherein, the other art references are listed in Appendix II.

Argument – 37 C.F.R. 41.37(c)(1)(vii)

The Examiner has erred in fact, and an error in fact is an error in law. As discussed in detail below, the Examiner has improperly rejected the pending claims as obvious over the cited references. Accordingly, the Appellant respectfully requests withdrawal of these rejections of the claims. The rejections are discussed in the order addressed by the Examiner in the previous Office Action.

Claims 1-8, 10, 20 were rejected under 35 USC § 103 as being unpatentable over Miller in view of a plurality of references. Appellant notes that claim 1 defines “a cylindrical support rod having a central portion, said central portion having a surface roughness of from about 0.1 micron to about 4 microns, wherein said central portion has an ovality of up to about 0.5 mm and a bow of up to about 0.7 mm/m along a longitudinal

axis of said support rod assembly”. That is, the support rod has the characteristics of surface roughness, bow, and ovality.

Miller does not disclose, teach or suggest a support rod as claimed. The mandrel disclosed in Miller is not a support rod as claimed. Particularly, it has neither the structure nor the function of the claim element to which it has been applied. Miller is relied upon in the Office Action to disclose the support rod, and yet fails to do so. The Office Action states “...a support rod with the claim characteristics were not specifically presented...” (Office Action 5/9/06, paragraph 10) Appellant agrees, and adds that no support rod at all was disclosed in Miller with or without the claim characteristics.

The Office Action asserts that it would obvious to expect the same characteristics on the support rod that contacts the quartz tube that the prior art teaches are characteristics of the quartz tube itself. This is because that contact supposedly would impart the claimed characteristics from the support rod to the quartz tube. (Office Action 5/9/06, page 10). There is utterly no justification for that statement. During operation, the quartz tube is so hot that it flows and sags and can be drawn into fibers. The Office Action would have a characteristic of a work piece that becomes fluid anticipate and obviate a property, such as a surface finish, on a structurally and functionally dissimilar part. This is improper and fails to meet the burden of disclosing, teaching or suggesting all of the claim elements in one or more references from the prior art. To make a *prima facie* case of obviousness at least all of the claim elements need be shown or reasonably suggested. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991); MPEP § 2143.

Without the Miller mandrel being the Office Action substitute for the claimed support rod element, a *prima facie* case of obviousness is not made. That the mandrel is removed before operation (Office Action, 5/9/06, paragraph 10) demonstrates beyond doubt that it is not, cannot, be present as a support rod during use as defined by the function of the claimed invention. That the Miller mandrel is present for soot consolidation, and is then removed prior to flowing the quartz tube, does not infer that the operation of the Miller mandrel on the soot tube is reasonably like the interaction of the support rod on the quartz tube.

If the Miller mandrel is “necessary for supporting the central sections of the quartz tube” (Office Action, 5/9/06, page 11) as asserted in the Office Action, then the absence of the Miller Mandrel *when the glass is hot, flowing and sagging during use* would make the modification suggested by the Office Action inoperable. In Miller, the soot tube may be used as the substrate, but not the Mandrel. Miller discloses “After the soot cylinder 11 has been consolidated to form a solid glass tube, the mandrel 12 is removed and the [soot] tube is used as a substrate.” The Miller mandrel forms the soot cylinder, and does not act as a support rod as claimed. The mandrel is removed during processing and is entirely absent and unable to have or perform the function of a support rod as claimed. Particularly, the mandrel cannot “straightens and supports said quartz tube and prevents tapering of said inner diameter due to creep” as defined in claim 1. The Office Action does not address whether the soot tube satisfies the support rod element, and the Appellant declines to speculate at this point but expects that it does not.

A consistent mistake in the previous Office Actions has been that the claimed properties, characteristics and functions of parts of the claimed invention are drawn from prior art reference parts that bear little or no resemblance to the inventive parts. An example is the failure to articulate the difference between an article and a work piece with which the article is associated. “In determining whether a case of *prima facie* obviousness exists, it is necessary to ascertain whether the prior art teaching would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification.” *In re Taborisky*, 502 F.2d 775, 780, 183 U.S.P.Q. 50, 55 (C.C.P.A. 1974). More specific mistakes are discussed below.

In view of Monberg, the Office Action appears to characterize a bow element of the object being worked on (the sintered quartz tube), which is a structurally dissimilar element, as disclosing the same element with regard to the claimed support rod. Clearly, the claimed support rod is not the disclosed quartz tube of Monberg. Any bow measurement of the quartz tube does not disclose, teach or suggest a bow of a support rod as claimed. A point of fact is that there is not even an assertion in the Office Action that the quartz tube is in continuous contact with the support rod such that the bow of one would mirror the bow of the other. Without even referencing the claimed support rod, if

any support rod held only opposing ends of a work piece (like a chair leg on a wood lathe) the work piece could have any profile independent of the tool holding it.

Ovality requires the Office Action to add another reference. There is no stated relationship between the bow element and ovality element in any of the references. The addition of Lum attempts to address ovality, but again the ovality disclosed is for the quartz tube, and not for the support rod as claimed. It makes no difference whether “up to” includes circular or ovality of zero. For anticipation or for *prima facie* case of obviousness all of the claim elements, or at least a reasonable suggestion therefor, need be shown before a meaningful discussion can occur. Here, no support rod as claimed is shown. That there is a quartz tube of any profile is not sufficient to form a *prima facie* case of obviousness as a claim element is still missing.

Yokokawa is added to the mix of disclosures to supply the missing surface roughness element for the support rod surface. The Office Action admits “Yokokawa discloses a cylindrical quartz tube.” A flaw in the Office Action is that Yokokawa discloses the surface roughness for a different element (the quartz tube) and not for the support rod as claimed. Accordingly, the element of surface roughness for the support rod has not been shown in the art reference relied on to supply that claim element. No *prima facie* case of obviousness has been made.

O’Brien is not relied on to cure any of the deficiencies discussed hereinabove. Rather, O’Brien is presented to disclose a graphite mandrel. The corresponding claim (claim 3) depends from allowable claim 1, and is allowable for at least the reasons that claim 1 is allowable.

Kyoto is not relied on to cure any of the deficiencies discussed hereinabove. Rather, Kyoto is presented to disclose an inert environment and/or inert material. The corresponding claim (claim 20) depends from allowable claim 1, and is allowable for at least the reasons that claim 1 is allowable.

Because of the foregoing, at least the support rod has not been demonstrated in the prior art, either in individual references or in the combination of references provided. Particularly, the attributes and characteristics associated with the quartz tube work pieces disclosed in the art references do not disclose, teach, or reasonably suggest at least the

support rod as defined in claim 1, and all the claims that depend thereon. Appellant respectfully requests that a notice of allowability be issued for the pending claims.

Claims 9-12, and 19 were rejected under 35 USC § 103 as unpatentable over Miller in view of Monberg and the other art references discussed and cited hereinabove with reference to claim 1. Claims 9-12 and 19 are currently pending, all of which depend from allowable claim 1. Further, and as noted hereinabove, the Office Action does not clarify how the mandrel of Miller anticipates or obviates the support rod, or assembly, as claimed.

Claim 13 was rejected under 35 USC § 103 as unpatentable over Miller in view of Monberg and the other art references discussed and cited hereinabove with reference to claim 1, and further in view of Rupert and Baniel. While a patchwork quilt of references may be combined, as correctly suggested in the Office Action, the assertion that the combination would be useful for addressing bubble formation and perfection of fit does not address why the particular references would be so combined. For a *prima facie* case of obviousness the reason for the particular selection of elements, and a statement as to the reasonableness of success is needed. Here, the only thing to go on is the Appellant's specification outlining the benefit of the combination.

Claims 14-15 were rejected under 35 USC § 103 as unpatentable over Miller in view of Monberg and the other art references discussed and cited hereinabove with reference to claim 1, and further in view of Rupert. Claims 14-15 are pending and depend from allowable claim 1. The Office Action relies on Rupert to "disclose a coupling in the retaining portion or a second retaining portion" that Miller fails to disclose. Rupert is also relied on as it "teaches of another support structure used in the sintering of a hollow soot cylinder or a quartz tube."

The motivation of using the retaining portions of Rupert to solve a problem associated with Miller implies that Miller, by itself, would have the problem of deformation and sagging during use. That implies further that the mandrel of Miller is not present, or not capable, during use to prevent these actions. Accordingly, the Miller mandrel is not, as mistakenly suggested, anticipating or obviating the claimed support rod as discussed above in more detail.

Additionally, it is not clear how the retaining portions would interact with the quartz tube in the presence of a mandrel. Unfettered access to contact the quartz tube can only be obtained if there are no other contacting portions. Here, the modification requires both the retaining portions and the mandrel to be in contact with the quartz tube, but provides no advice as to how, or if, this is physically possible. That each of the retaining portions and the mandrel can separately contact the quartz tube does not imply that they can together successfully contact the quartz tube. The prior art must enable a person of ordinary skill to make and use the invention. *Beckman Instruments, Inc. v. LKB Produkter AB* 892 F.2d 1547 C.A.Fed. (Md. 1989).

Claims 16-18 were rejected under 35 USC § 103 as unpatentable over Miller in view of Monberg and the other art references discussed and cited hereinabove with reference to claim 1, and further in view of Lane. Claims 16-18 are currently pending, and depend from allowable claim 1.

The Office Action comments generally on several points. As noted above, a telling point is the statement that “a support rod with the claimed characteristics were not specifically presented.” The stark contrast between what is claimed and what the cited art teaches is supposedly reconciled by the statement, made without support, that “the support rod of Miller is in contact with the quartz tube to be sintered, and in order to impart the claimed characteristics that the prior art teaches on the sintered quartz tube, it would be obvious to expect the same characteristics on the support rod contacting the quartz tube.” While the Appellant appreciates the honest assessment of the deficiencies of the cited art, to be “obvious” several burdens must be satisfied, and here none were. Discussed at various places herein, Miller discloses a removable mandrel and not a support rod; the nature of the contact of the mandrel to tube was not even asserted to be such that the mandrel contacts the tube where the supposed claim characteristics reside; no mechanism is asserted that begins to describe the transfer of characteristics from one structurally and functionally different part to another; and, with regard to “obvious” modification there is conflicting motivation to modify (at best), no correspondingly similar elements, and no articulable reasonable expectation of success if one of ordinary

skill in the art were to combine all of these features in one apparatus that the apparatus could work or would produce the effect asserted in the Office Action.

This Appeal brief is amended to include in the summary of claimed subject matter a map of each independent claim to the specification by page, paragraph number and line. Appellant notes that *as filed* the map was sufficient in terms of the Figures and reference numbers, that the Appeal brief complied with format requirements as filed, that formatting formalities indicated in the Office communication have been addressed, and requests that the Appeal move to a discussion on the actual merits.

In summary of the arguments set forth, the Examiner errs both in fact and in law. There is no *prima facie* case of obviousness made. Because of the foregoing, the claimed invention has not been disclosed, taught or suggested, either in individual references or in the combination of references provided. Appellant respectfully requests that a notice of allowability be issued for the pending claims.

Claims Appendix - – 37 C.F.R. 41.37(c)(1)(viii)

Appendix I containing a listing of the claims as pending in this Appeal is attached following the signature page of this Brief.

Evidence Appendix – 37 C.F.R. 41.37(c)(1)(ix)

An Appendix II containing a copy of the references cited in the arguments presented here is attached following the Claim Appendix of this Brief.

Related Proceedings Appendix – 37 C.F.R. 41.37(c)(1)(x)

There are no related proceedings to this Appeal. An Appendix III stating that there are no related proceedings under 37 C.F.R. 41.37(c)(1)(x) is provided.

Accordingly, Appellant respectfully submits that the claims 1-20 define allowable subject matter over the cited art, and requests that the rejections to Claims 1-20 be withdrawn.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Shawn A. McClintic", written over a horizontal line.

Shawn A. McClintic, Attorney for Appellant
Registration No. 45,856
Telephone: (518) 387-5448
Niskayuna, New York

10/17/06

Date

Claims Appendix I under 37 C.F.R. 41.37(c)(1)(viii)

Following are a listing of claims as currently pending in the Application that is the subject of this Appeal.

Listing of Claims:

Claim 1. (Previously presented) A system for sintering a quartz tube, said quartz tube having a cylindrical wall defining an annular space and an outer layer of silica soot deposited on an outer surface thereof, said system comprising:

a) a furnace for heating said quartz tube to a temperature of at least 1400°C in a controlled atmosphere, said furnace having a heating zone in which said quartz tube is sintered;

b) a support rod assembly disposable in said annular space, said support rod assembly comprising: (i) a cylindrical support rod having a central portion, said central portion having a surface roughness of from about 0.1 micron to about 4 microns, wherein said central portion has an ovality of up to about 0.5 mm and a bow of up to about 0.7 mm/m along a longitudinal axis of said support rod assembly, wherein said cylindrical support rod has a coefficient of thermal expansion that is greater than a coefficient of thermal expansion of said quartz tube, wherein said support rod assembly is substantially chemically inert with respect to silica in an atmosphere comprising an inert gas and at least one of fluorine, chlorine, and combinations thereof at temperatures of at least 1400°C, and wherein said support rod assembly straightens and supports said quartz tube and prevents tapering of said inner diameter due to creep during sintering of the quartz tube; and (ii) at least one retaining portion coupled to at least one end of said cylindrical support rod for preventing slippage of said quartz tube from said support rod assembly; and

c) means for positioning said support rod assembly and said quartz tube within said heating zone.

Claim 2. (Previously presented) The system according to Claim 1, wherein said central portion has an ovality of up to about 0.5 mm and a bow of up to about 0.7 mm/m along a longitudinal axis of said cylindrical support rod.

Claim 3. (Original) The system according to Claim 1, wherein said central portion comprises a carbonaceous material.

Claim 4. (Original) The system according to Claim 3, wherein said carbonaceous material comprises graphite.

Claim 5. (Original) The system according to Claim 4, wherein said graphite has been purified in the presence of chlorine gas.

Claim 6. (Original) The system according to Claim 4, wherein said central portion further includes a coating disposed on an outer surface of said central portion, wherein said coating comprises at least one of graphite deposited by chemical vapor deposition, amorphous carbon, and boron nitride.

Claim 7. (Previously presented) The system according to Claim 4, wherein said graphite has an ash content of less than 100 parts per million.

Claim 8. (Original) The system according to Claim 1, wherein said central portion comprises a cylindrical alumina core and a coating disposed on an outer surface of said cylindrical alumina core, wherein said coating comprises at least one of graphite deposited by chemical vapor deposition, amorphous carbon, and boron nitride.

Claim 9. (Original) The system according to Claim 1, wherein said central portion comprises a tubular structure.

Claim 10. (Original) The system according to Claim 1, wherein said central portion comprises a solid rod.

Claim 11. (Original) The system according to Claim 1, wherein said central portion has an outer diameter from about 15 mm to about 50 mm.

Claim 12. (Previously presented) The system according to Claim 1, wherein said central portion has a length from about 750 mm to about 1500 mm.

Claim 13. (Original) The system according to Claim 1, wherein said quartz tube has an inner diameter and said central portion has an outer diameter, and wherein said inner diameter differs from said outer diameter by up to about 0.1 mm over the length of said central portion.

Claim 14. (Original) The system according to Claim 1, wherein said at least one retaining portion comprises a coupling for engaging said means for positioning and at least one of a first end of said quartz tube and an end of said cylindrical support rod.

Claim 15. (Original) The system according to Claim 14, further including a second retaining portion affixed to a second end of said cylindrical support rod and distal to said coupling.

Claim 16. (Original) The system according to Claim 1, wherein said positioning means comprises a rod, wherein said rod is one of a quartz rod and a graphite rod, and wherein said positioning means is coupled to an external support structure.

Claim 17. (Original) The system according to Claim 16, wherein said positioning means further includes a drive system coupled to said rod, wherein said drive system is capable of moving said quartz tube and said support rod assembly through said furnace.

Claim 18. (Original) The system according to Claim 1, wherein said positioning means comprises a drive mechanism coupled to said furnace, wherein said drive mechanism is capable of moving said furnace relative to a longitudinal axis of said quartz tube.

Claim 19. (Original) The system according to Claim 1, wherein said system is adapted to sinter a quartz fiber optic sleeve tube.

Claim 20. (Original) The system according to Claim 1, wherein said controlled atmosphere comprises helium and at least one of and chlorine, fluorine, and combinations thereof.

Claims 21. – 71 (Cancelled)

Evidence Appendix II under 37 C.F.R. 41.37(c)(1)(ix)

The following pages include the references referred to in the argument and body of this Appeal Brief.

Included are:

Lum et al	U.S. Patent No. 6,732,549
Monberg et al.	U.S. Patent No. 6,550,280
Yokokawa	U.S. Patent No. 5,785,729
Yokokawa	U.S. Patent No. 5,769,921
Miller	U.S. Patent No. 5,076,824
Kyoto et al	U.S. Patent No. 4,969,941
O'Brien, Jr	U.S. Patent No. 4,276,072

Related Proceedings Appendix III under 37 C.F.R. 41.37(c)(1)(x)

There are no related proceedings to this Appeal.